

RE-EVALUATION OF THE DISTRIBUTION OF *GEOCRINIA LAEVIS* (ANURA: LEPTODACTYLIDAE) IN SOUTH AUSTRALIA

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Summary

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A survey of the known range of the Smooth Frog, *Geocrinia laevis* (Günther, 1864) in South Australia was undertaken to determine the current distribution and abundance of this species. A total of 58 locations was visited throughout the South East and *G. laevis* was collected or heard calling at 13 sites within or near the Reedy Creek / Dismal Swamp drainage system. Despite very few reports of this species in recent years it is locally abundant and under no obvious threat of decline

KEY WORDS: *Geocrinia laevis*, distribution, frogs, South Australia, frog census, status, conservation.

Introduction

There have been few comprehensive studies to document the distribution of the frogs of South Australia. Brook (1984) produced an atlas of the known distribution of the frog fauna of SA by condensing published and unpublished data from various sources. Other published studies have generally been focused on unusual range extensions and first records in the State (Tyler 1971; Bird & Tyler 1990; Johnston 1990). Overviews and species lists for the State are given in Tyler (1977, 1978, 1994, 1997).

Since 1994 the South Australian Environment Protection Agency has conducted an annual frog census in September (November in the first year, September thereafter) involving the public making tape recordings of the frogs calling from waterways throughout South Australia. This work has highlighted the distribution and a measure of the seasonal abundance of frogs, mostly from the more southern parts of SA (Goonan *et al.* 1997, 1998; Walker *et al.* 1999). Some species are poorly represented or have not been recorded through the method being applied by the census, including *Geocrinia laevis* (Günther, 1864) which had not been recorded (Goonan *et al.* 1997, 1998; Walker *et al.* 1999). *Geocrinia laevis* is mainly an autumn-winter breeder, calling only infrequently during the period in which the frog census has been carried out.

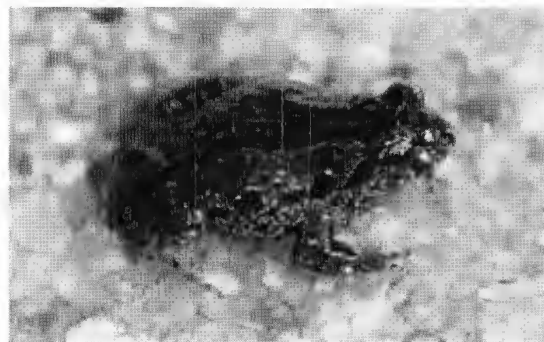


Fig. 1. *Geocrinia laevis* from Canunda Conservation Park (SVL = 33 mm).

Geocrinia laevis is a medium sized frog (22 – 35 mm snout vent length) with short limbs and smooth skin (Fig. 1) that may be easily confused with *Crinia signifera* Girard, 1853 or members of the genus *Pseudophryne* Fitzinger, 1843 (Barker *et al.* 1995). Distinguishing characteristics include pale pink patches underneath the legs, in the groin and sometimes in the axillae (Woodruff & Tyler 1968; Tyler 1978; Barker *et al.* 1995).

Like *Pseudophryne*, *G. laevis* does not breed in water. Males call from the ground in moist leaf litter and amongst grass. The advertisement call is a long slowly pulsed rattling or creaking sound, the first note often being the longest - “cre-e-e-e-e-e-ek cre-e-e-c-ck cre-e-ek cre-c-ck” (Woodruff & Tyler 1968; Barker *et al.* 1995). *Geocrinia laevis* lays large, unpigmented eggs in loose, elongated masses attached to moist terrestrial vegetation. Major development occurs inside the egg capsule and following flooding tadpoles hatch in the water, with complete

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development taking about six months (Tyler 1994; Barker *et al.* 1995). The habitat of *G. laevis* is reported as being leaf litter in dry *Eucalyptus* or pine forests subject to temporary flooding (Tyler 1978; Barker *et al.* 1995).

Geocrinia laevis was first reported in South Australia from a specimen (South Australian Museum, Adelaide (SAMA) R8118) collected near Mt Burr in 1966 (Woodruff & Tyler 1968). Before this it had been found in Tasmania, King Island, the Grampians and in South West Victoria from Dartmoor to Pt Campbell (Woodruff & Tyler 1968; Beck 1975). Beck (1975) surveyed the South East of South Australia between 1968 and 1974 and found

that *G. laevis* was confined to the Reedy Creek and Dismal Swamp drainage system in the lower South East. Since then, there have been no major reports of this species.

With the major and continual modifications to the drainage system in the South East of South Australia it seemed pertinent to determine the current status of *G. laevis* in the region. As *G. laevis* may inhabit areas which are vulnerable to agricultural development and because there is no detailed knowledge of its current distribution it is possible that any future development may impact significantly upon populations of this species. The purpose of this study was to determine the current

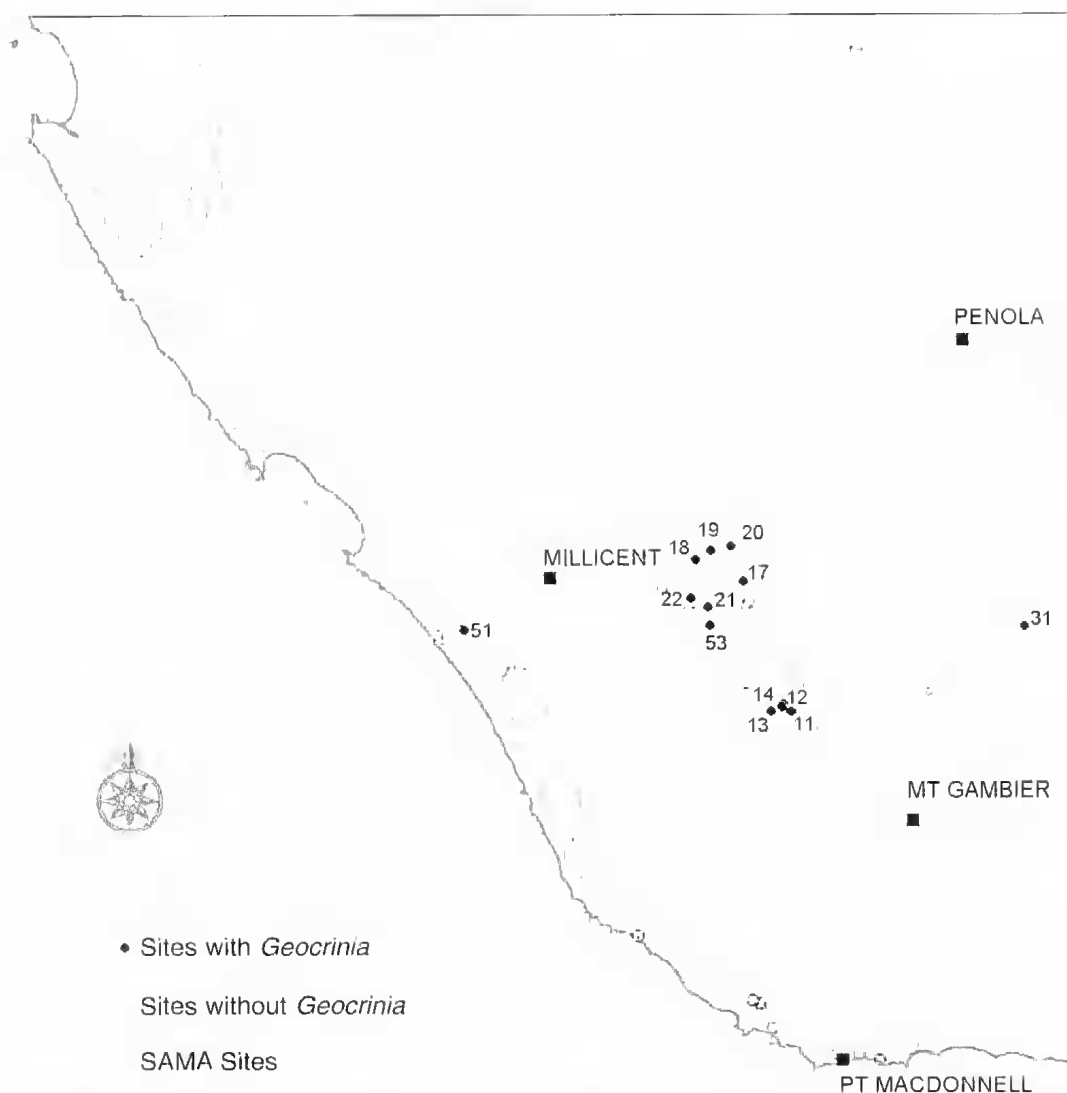


Fig. 2. Surveyed distribution of *Geocrinia laevis* in the South East of South Australia. Sites from SA Museum records are included for reference.

distribution and status of *G. laevis* in South Australia.

Materials and Methods

Existing data sources (published and unpublished) including SAMA records and NP&WS regional surveys (see Foulkes 1998) were examined. Locations were subsequently superimposed on floristic vegetation maps of the South East in order to predict possible suitable habitat for *G. laevis*. B. Grigg from Forestry SA also provided maps of Forestry land and suggested areas where frogs might occur.

Surveys were undertaken during March, June and August 1999. A total of 58 locations was visited (Fig. 2), including 10 sites based on SAMA records and two sites from the NP&WS survey. The recorded coordinates for some of the SAMA sites appeared to be imprecise or inaccurate because the sites did not have suitable habitat for *G. laevis*: in these cases, sites with suitable habitats which were nearby the recorded coordinates, were sampled instead. Each site with *G. laevis* present was visited only once, with the exception of some sites visited in March which were revisited in June and SAMA sites which did not have *G. laevis* calling in June; these sites were sampled again in August. Sites visited on multiple occasions did not have *G. laevis* calling during subsequent visits.

Calling *G. laevis* males were sought by ear or by use of a directional microphone attached to a Sony DAT recorder. Where possible any calling males were located, usually by triangulation, and captured. The call of *Crinia signifera* is quite variable and can sometimes sound very similar to the call of *G. laevis* or *Pseudophryne* sp. Therefore, any calls which

could not be identified immediately were recorded for later examination.

In addition, searches were carried out at each site. This involved looking under logs, leaf litter, stones, and amongst vegetation, for a minimum of one hour, during the day or early evening. Any frogs found were collected and placed in large cotton or plastic bags for later examination. A number of frogs was collected when they were seen on wet roads at night, but no *G. laevis* were found at these times. Frogs were released on site at the conclusion of collecting and identification.

Numerous plant samples were also collected for later identification to determine the common composition of flora associated with the sites at which *G. laevis* were found.

Results

Geocrinia laevis was present at 12 sites within the Reedy Creek / Dismal Swamp drainage area, and also from a site in the Canunda National Park (Table 1). It was not found in the Pt MacDonnell area where it has been listed in SAMA records. A total of six *G. laevis* was collected (two from "The Marshes" wetland, two from Mt Burr, one from "Honan's Scrub" and one from Canunda National Park). The presence of calling males permitted a positive identification of the species at these and other locations (Table 1). Analysis of the recordings of unidentified calls using a computer based spectrograph (Specht 1998) identified only one other site (site 17) where *G. laevis* occurred. All other recordings were confirmed as being *C. signifera*.

Since the Beck survey a small number of *G. laevis* has been collected in South Australia, some reported

TABLE 1. Summary of sites where *Geocrinia laevis* were detected.

Site	Site Name	Species Present	Northing	Easting
11	Honan's Scrub 1	GL, CS, LD, LE	5825111	467855
12	(Boggy Field) 20 km S of Kalangadoo	GL, LE	5825930	467020
13	Honan's Scrub 2	GL, CS, LE	5825057	465885
14	Honan's Scrub 3	GL, LE	5825661	466967
17	Brooksby's Laine (nr Lake Leake)	GL, CS, LE	5838999	462902
18	Mt Burr Forest 1	GL, CS, LE	5841169	457848
19	Mt Burr Forest 2 (nr Quarry)	GL	5842091	459437
20	Roadside (nr Mt Burr)	GL, LE	5842629	461534
21	The Marshes 1	GL, LE	5836207	459157
22	The Marshes 2	GL, CS, LE	5837195	457385
31	Roadside 2 (Mingboof)	GL, CS	5834231	492158
51	Canunda CP 2	GL	5833737	433832
53	The Marshes 3	GL	5834345	459415

Northings and Eastings as on Australian Map Grid, Zone 54.

(GL = *Geocrinia laevis*, CS = *Crinia signifera*, LD = *Limnodynastes dumerili*, LE = *Litoria ewingi*).

to the SAMA (M. Hutchinson pers. comm. 1999) and others to the SA Frog and Tadpole Study Group (E. Baskett pers. comm. 1999). Included in the SAMA records are two sites to the west of Pt MacDunnell near the coast. One location (SAMA record listed as "Blanche Bay") was a coastal shrubland / sedgeland in sand dunes which seemed to be an unlikely habitat for *G. laevis*. The closest location, just inland from the sand dunes, which may have been suitable habitat for frogs did have *Limnodynastes peronii* (Duméril and Bibron, 1841) and *C. signifera*, but there was no indication of any *G. laevis*. A number of sites sampled around the other southern location ("Section 346 Hundred of Kongorong") also yielded no sign of *G. laevis*. There was nothing obvious to suggest that there had been any significant land use changes in the area since the frogs in the SAMA were collected there in 1983. The predominant land use appeared to be grazing of livestock with most of the land cleared of natural vegetation.

Discussion

Gecorhinus laevis was found at 13 sites in the South East of South Australia during this study. Apart from the site in Canunda National Park all of the sites were within the Reedy Creek / Disnall Swamp drainage area. This corresponds to the distribution recorded by Beek (1975) with the addition of the Minghowl site further to the east.

Beek (1975) speculated that the site at Canunda was probably the result of "eggs or larvae washed down one of the man-made drains which cross the area between the Millicent Hills and the coast". It seems more likely however that the population at Canunda National Park is a relict of a previous distribution that covered much of the South East north of Mt Gambier. Prior to the drainage scheme in the South East, which first began around 1862, much of the Upper South East of South Australia experienced periods of severe flooding and inundation (South East Drainage Board 1980), with many localities having permanent or near permanent waters. The water movement in the Millicent area tended to be directed North West towards Kingston SE, or South West towards Lake Bonney (i.e. in the direction of what is now Canunda National Park).

Gecorhinus laevis were found in depressed clearings subject to inundation at the edges of native forests or pine plantations (Fig. 3), although one site was a boggy farm paddock (site 12). This site was located only a few hundred metres from a nearby forested area. *Gecorhinus laevis* was also found at sites 17, 20 and 31 in clearings near forested areas alongside main roads.

The clearings usually comprised reeds, grasses and



Fig. 3. Clearing in Mt Burr Forest: typical habitat of *Gecorhinus laevis* in the South East of South Australia

sedges, with the occasional shrub and herbaceous plant. The major plants collected from the sites were the nobby clubrush (*Isalepis nodosa* (Rothb.), 1810), sea rush (*Juncus kraussii* Hochst., 1845), and variable sword-sedge (*Lepidosperma laterale* R. Br., 1810). Other plants commonly seen included the buttercup (*Ranunculus* sp. Linn.), spiny mudgrass (*Pseudoraphis spinescens* (R. Br.) Vickery, 1952) and other assorted grasses. A number of fallen branches and other timber from logging also provided habitat under which frogs could shelter.

The dead and dying reeds, sedges and grasses formed a dense mat which retained moisture and provided a network of refuges in which *G. laevis* and other frogs could hide. As a result, it was almost impossible to catch the frogs, even when triangulation suggested they were only a few centimetres from the collectors. An intensive search through the undergrowth and under fallen timber produced little more success. It is quite possible that non-calling individuals may have been present, but not detected, at some sites.

The locations where *G. laevis* can now be found are all areas which previously had permanent swamps and wetlands, including the Canunda site, and would have formed a continuous or nearly continuous expanse of water during the wet months (South Eastern Drainage Board 1980). Even though man-made drains were created to increase surface flow to the Lake Bonney area, to drain land for agricultural development and to allow expanded settlement in the region, this area always had a high rainfall and natural drainage features that probably enabled populations to colonise the Canunda location prior to drainage activities.

Although *G. laevis* has a restricted distribution, the majority of locations identified had more than 50 males calling. The species is still found in the area where it was reported in 1974 and consequently does

not appear to be under any obvious threat of decline in the region. Both "The Marshes" wetland area and "Honan's Scrub" are large native Forest Reserves with the same status as Conservation Parks, and therefore are not likely to be planted or disturbed (B. Grigg pers. comm. 1999). The sites within Mt Burr Forest are located in unused areas that are unsuitable for planting due to flooding (B. Grigg pers. comm. 1999). It is possible that these sites may be planted at the next rotation, in approximately 25 years, but only if flooding could be excluded.

Following the survey recorded above the EPA ran a census of the frogs calling from South Australian waterways in September 1999. *Geocrinia laevis* was recorded from "Honan's Scrub" and "Crouches" within the Dismal Swamp / Reedy Creek area; "Crouches" was not included in the present study. Fewer than ten calling *G. laevis* were recorded from these locations (Walker *et al.* unpub.).

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